REMARKS

This communication is in response to the Office Action dated July 6, 2006. Claims 1-29 are pending in the present Application. Claims 14-20 have been allowed. Claims 1-6, 8-12, 14-19, 21-24 and 26-28 are rejected. Claims 7, 13, 20, 25 and 29 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim Objections

The Examiner states:

> **Claim 25 is objected to because of the following informalities: Claim 25 recites the limitation "the computer program product" in claim 19. There is insufficient antecedent basis for this limitation in the claim.**

Applicant asserts that Claim 25 has been amended to correct the above-referenced informality. Specifically, Claim 25 has been amended to depend from Claim 21. Consequently, the Examiner's objection is no longer applicable.

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Claims 1, 8, 14, 21 and 26

For ease of review, Applicant reproduces independent claims 1, 8, 14, 21 and 26 herein below:

1. A method for dynamically controlling cooling systems in a data center comprising:

determining a workload within the data center;

determining an amount of heat being generated as a function of the workload; and

activating each of a plurality of different types of cooling systems within the data center in an optimal fashion based on the heat being

generated.

8. A system for dynamically controlling cooling systems in a data center comprising:

means for determining a workload within the data center;

means for determining an amount of heat being generated as a function of the workload; and

means for activating each of a plurality of different types of cooling systems coupled within the data center in an optimal fashion based on the amount of heat being generated.

14. A data center comprising:

a global computer system;

a plurality of different cooling systems coupled to the global computer system; and

a cooling system control module coupled to the global computer system and the plurality of different cooling systems wherein the cooling system control module includes logic for:

determining a workload within the global computer system;

determining an amount of heat being generated as a function of the workload; and

activating each of a plurality of different types of cooling systems coupled to the global computer system in an optimal fashion based on the amount of heat being generated.

21. A computer program product for dynamically controlling cooling systems in a global computer system, the computer program product comprising a computer usable medium having computer readable program means for causing a computer to perform the steps of:

determining a workload within the global computer system;

determining an amount of heat being generated as a function of the workload; and

activating each of a plurality of different types of cooling systems coupled to the global computer system in an optimal fashion based on the amount of heat being generated.

26. A cooling system control module for a data center comprising:

determination logic for:

determining a workload within the data center; and

determining an amount of heat being generated as a function of the workload; and

activation logic for activating each of a plurality of different types of cooling systems within the data center in an optimal fashion based on the amount of heat being generated.

The Examiner states:

> **Claims 1-6, 8-12, 14-19, 21-24 and 26-28 are rejected under 35 USC §102(e) as being anticipated by Patel et al. (US 2004/0264124).**

Applicant respectfully disagrees. The present invention includes a method and system for dynamically controlling cooling resources in a data center. The present invention dynamically controls a plurality of different types of cooling resources within a data center based on the workload constraints (power consumed, latency, etc.) of the data center. Accordingly, each of the plurality of different types of cooling resources is activated in an optimal fashion based on the workload constraints. As a result of the use of the method and system in accordance with embodiments of the present invention, a substantial savings in operational costs related to cooling resources is achieved.

Claim 1 recites a method for dynamically controlling cooling resources in a data center that includes determining a workload within the data center, determining an amount of heat being generated as a function of the workload and activating each of a plurality of different types of cooling systems within the data center in an optimal fashion based on the heat being generated.

The Examiner states that the Patel reference anticipates the present invention. Applicant respectfully disagrees and asserts that the Patel reference does not disclose ***activating each of a plurality of different types of cooling systems within a data center in an optimal fashion*** based on the heat being generated as recited in claim 1 of the present invention. Patel discloses a cooling system for cooling computer systems detects heat dissipated by the computer systems. If the heat dissipated by the computer systems exceeds a threshold, at

least one component of the computer systems is placed in a lower-power state to reduce heat dissipation. Applicant asserts that Patel reference only relates to the cooling of the components of individual computers. ***Patel does not teach or suggest the step of activating each of a plurality of different types of cooling systems within a data center in an optimal fashion based on the heat being generated.*** The Examiner stipulates that Patel teaches this step in paragraph 26. Paragraph 26 of Patel reads:

> The cooling system is operable to maintain the temperatures of components of the computer systems within predetermined ranges when the computer systems are dissipating the nominal amount of heat. By designing cooling systems based on nominal heat dissipation rather than maximum heat dissipation, generally, more efficient and cost effective cooling systems may be used. For example, smaller fans or less complicated coolant systems may be used, because a smaller amount of heat is being removed. Also, significantly less energy may be required to power the cooling system based on nominal heat dissipation. For example, a computer system may have a nominal heat dissipation of 200 Watts (W) and a maximum heat dissipation of 350 W. Significantly more energy is required to cool the computer system dissipating 350 W rather than 200 W, especially when multiple computer systems are being cooled. As an approximation, the energy needed to cool a computer system (e.g., power used by a blower) is generally 10% of the amount of heat being dissipated by the computer system (e.g., 35 W of energy to cool 350 W of heat dissipation and 20 W to cool 200 W of heat dissipation). Based on this example, a power savings of 15 W (approximately 43%) is achieved per computer when a fixed velocity component (e.g., blower or a fan) is used.

Applicant fails to see how this paragraph demonstrates the step of activating each of a plurality of different types of cooling system within the data center in an optimal fashion based on the heat being generated as recited in the present invention. The cooling system of the present invention includes a plurality of different types of cooling systems. For example, in an embodiment of the present invention, a first type of cooling system is an air-based cooling system, a second type of cooling system is a liquid-based cooling system and a third type of cooling system is a gas-based cooling system. ***The Patel reference***

does not disclose the implementation of a plurality of different cooling systems as recited in the independent claims of the present invention.

Furthermore, claim 2 recites an embodiment whereby the optimal fashion is based on a cost associated with the activation of each of the plurality of different cooling systems. ***Patel does not teach or suggest an optimal fashion based on a cost associated with the activation of each of the plurality of different cooling systems.*** The Examiner stipulates that Patel teaches this step in paragraph 33. Paragraph 33 is shown above.

Although Patel discloses cooling optimization to minimize energy utilization, Applicant fails to see how this paragraph demonstrates that an optimal fashion of activating each of a plurality of different cooling systems is based on a cost associated with the activation of each of the plurality of different cooling systems.

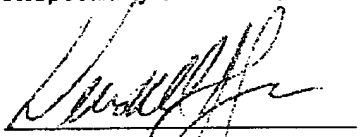
Consequently, since the Patel reference does not disclose the implementation of a plurality of different cooling systems, Patel does not disclose the step of activating each of a plurality of different types of cooling systems within the data center in an optimal fashion based on the heat being generated as recited in the independent claims of the present invention. Accordingly, independent claims 1, 8, 14, 21 and 26 of the present invention are allowable over the Patel reference.

Claims 2-6, 9-12, 15-19, 22-24 and 27-28

Since claims 2-6, 9-12, 15-19, 22-24 and 27-28 are respectively dependent on claims 1, 8, 14, 21 and 26, the above-articulated arguments with regard to independent claims 1, 8, 14, 21 and 26 apply with equal force to claims 2-4, 6, 9-10, 22-24 and 27-28. Accordingly, claims 2-4, 6, 9-10, 22-24 and 27-28 should be allowed over the Examiner's cited reference.

Applicant believes that this application is in condition for allowance. Accordingly, Applicant respectfully requests reconsideration, allowance and passage to issue of the claims as now presented. Should any unresolved issues remain, Examiner is invited to call Applicant's attorney at the telephone number indicated below.

Respectfully submitted,



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